

HIGH-OCCUPANCY VEHICLE GUIDELINES

**for Planning, Design
and Operations**

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**State of California
Business, Transportation
and Housing Agency**



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Department of Transportation
Division of Traffic Operations**

web address: <http://onramp/hq/trafops/otrafopr/hov/hov.html>



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This guidance is an update of the July 1991 Guidelines for Planning, Design and Operations of High-Occupancy Vehicle (HOV) facilities. It provides statewide uniformity of the development of HOV facilities and details the areas of responsibility for implementation. All measures are expressed in metric units.

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web address: <http://onramp/hq/trafops/otrafopr/hov/hov.html>



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AADT	Annual Average Daily Traffic	MTDB	Metropolitan Transit Development Board
AASHTO	American Association of State Highway and Transportation Officials	MTS	Metropolitan Transit System
AC	Asphalt Concrete	MUTCD	Manual on Uniform Traffic Control Devices
AHS	Advanced Highway Systems	NEPA	National Environmental Policy Act
AQMP	Air Quality Management Plan	NHS	National Highway System
ATMS	Advanced Traffic Management System	O&D	Origin and Destination
ATSD	Advanced Transportation System Development	OC	Overcrossing
AVR	Average Vehicle Ridership	OCTA	Orange County Transportation Authority
BT&H	Business, Transportation and Housing Agency	OCTC	Orange County Transportation Commission
CARB	California Air Resources Board	PCC	Portland Cement Concrete
CCAA	California Clean Air Act	PE	Project Engineer
CEQA	California Environmental Quality Act	PHV	Peak Hour Volume
CFR	Code of Federal Regulations	PM	Post-Mile
CHP	California Highway Patrol	PMS	Pavement Management System
CIP	Capital Improvement Program	PPH	Persons Per Hour
CMAQ	Congestion Mitigation and Air Quality	PR	Project Report
CMP	Congestion Management Program	PS&E	Plans, Specifications and Estimate
CMS	Changeable Message Sign	PSR	Project Study Report
CTC	California Transportation Commission	PSSR	Project Scope Summary Report
CTP	California Transportation Plan	PUC	Public Utilities Commission
CVC	California Vehicle Code	RCR	Route Concept Report
DOT	Department of Transportation	RFP	Request for Proposals
EIR	Environmental Impact Report	RTIP	Regional Transportation Improvement Plan
EIS	Environmental Impact Statement	RTPA	Regional Transportation Planning Agency
EPA	Environmental Protection Agency	RW	Right of Way
ETC	Electronic Toll Collection	SACOG	Sacramento Area Council of Governments
FCAA	Federal Clean Air Act	SANDAG	San Diego Association of Governments
FCR	Flexible Congestion Relief	SCAG	Southern California Association of Governments
FHWA	Federal Highway Administration	SHA	State Highway Account
FSP	Freeway Service Patrol	SHOPP	State Highway Operations and Protection Program
FTA	Federal Transit Administration	SIP	State Implementation Plan
HCM	Highway Capacity Manual	SSD	Stopping Sight Distance
HDM	Highway Design Manual	STAA	Surface Transportation Assistance Act
HNS	Highways of National Significance	STIP	State Transportation Improvement Program
HOT	High-Occupancy Toll	TASAS	Traffic Accident Surveillance Analysis System
HOV	High-Occupancy Vehicle	TCM	Transportation Control Measure
HTF	Highway Trust Fund	TCR	Transportation Concept Report
IC	Interchange	TDM	Transportation Demand Management
IGR	Intergovernmental Review	TDP	Transportation Development Plan
IRRS	Interregional Road System	TMA	Transportation Management Association
ISTEA	Intermodal Surface Transportation Efficiency Act	TMC	Transportation Management Center
ITS	Intelligent Transportation System	TMP	Transportation Management Plan
ITSP	Interregional Transportation Strategic Plan	TOS	Traffic Operations System
KP	Kilometer-Post	TRB	Transportation Research Board
LOS	Level of Service	TSM	Transportation Systems Management
LRT	Light Rail Transit	UC	Undercrossing
LTC	Local Transportation Commission	VMT	Vehicle Miles Traveled
MPO	Metropolitan Planning Organization	VPH	Vehicles Per Hour
MTC	Metropolitan Transportation Commission	VPHPL	Vehicles Per Hour Per Lane

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Foreword

The High-Occupancy Vehicle (HOV) lane system is used as a cost-effective operational strategy to maximize the people-carrying capacity of freeways. HOV facilities are a proven multimodal operational strategy supported by the Federal Highway Administration (FHWA), and local and regional agencies to improve both the current and future mobility, productivity, and quality of travel associated with congested transportation corridors in metropolitan areas. Lastly, HOV lanes have been used as a viable alternative, and in most cases is the only alternative that meets the federal air quality conformity standards for capacity-increasing projects in metropolitan areas.



California's HOV lanes were initially considered as an innovative strategy, adding a bus-only lane during the reconstruction of the San Francisco-Oakland Bay Bridge in 1962. As traffic demand continued to exceed the capacity of many of the state's metropolitan freeways, the California Department of Transportation (Department) and its regional partners opened HOV lanes in the most heavily congested areas of the state; that is, where HOV lanes offered the greatest potential benefit. The statewide HOV system has grown from a segmented 260 lane-miles in 1990 to the current (December 2003) comprehensive system network in excess of 1,100 lane-miles, where lane-miles are directional miles.

For most situations, retrofitting an HOV lane on an existing freeway requires some compromises in design standards. Back in 1987, FHWA's Procedure Memorandum D6103 introduced, under certain conditions, exceptions to AASHTO design standards. But it offered little guidance on acceptable geometric reductions. This was not surprising considering HOV facilities were still a relatively new development and few design guidelines were available at the time. In 1989, in response to District requests for guidelines to provide statewide consistency and uniformity, the Division of Traffic Operations began preparing the initial guidelines. The Division staff organized and chaired a committee of representatives from the metropolitan Districts, several Headquarters Divisions, the CHP, FHWA and private consultants. Without exception, the continued participation and cooperation received from the committee members was outstanding. It is their contribution and dedication that made the update to these guidelines possible.



Introduction

These guidelines are not intended to supersede Caltrans' Transportation Planning Manual, Project Development Procedures Manual, Highway Design Manual, Manual on Uniform Traffic Control Devices (MUTCD) and California Supplement to the MUTCD (which replaces the Caltrans' Traffic Manual), or other inter-Department manuals, procedures or practices. These guidelines are not, and should not be used as a set of standards. The Guidelines are advisory in nature and are to be used only when every effort to conform to established standards has been exhausted. When conformance is not possible, the deviation must be documented by a sound and defensible analysis and an approved design exception fact sheet.

The goal of these guidelines is to provide a "how to" document for planners, designers and operators of mainline HOV facilities. *Since individual site characteristics vary, only typical, full standard design scenarios can be presented. For situations not discussed, Districts are advised to consult the appropriate District and Headquarters representatives for advice and consent. For a list of HOV persons and contacts, please visit the following Intranet address at <http://onramp/hq/trafops/otrafopr/hov/hov.html>. This website is a valuable resource, updated regularly for the most current HOV Program guidance, inventory, reports, and related links.



Thirty years have passed since the opening of the bypass lanes at the San Francisco-Oakland Bay Bridge toll plaza. But it wasn't until the mid-1980's that operational and research data on HOV facilities started to accumulate. This means that guideline updates and revisions will be necessary, as new data becomes available. Through the years much has been learned on the subject although it is recommended that the Districts continue to conduct "before and after" operational studies for HOV projects implemented. Districts are encouraged to support continuous monitoring of the performance of their specific HOV facilities. It is the performance and evaluation of existing operational strategies; plans and services that provide the basis for making revisions to this guide and improved operations of the statewide HOV program. Headquarters' Division of Traffic Operations will, simultaneously, be conducting studies to resolve HOV issues, which are generic in nature and applicable statewide. The results from District and Headquarters' studies, with participation from outside agencies such as the Federal Highway Administration (FHWA), the California Highway Patrol (CHP) and the California Air Resources Board (CARB), will also continue to be used to update these HOV guidelines. A coordinated and cooperative effort is, therefore, needed to ensure these guidelines reflect the latest experience and operational data for planning, designing and operating HOV facilities.

Further discussion on HOV facilities may be found in other publications such as AASHTO's Guide for High-Occupancy Vehicle (HOV) Facilities, June 2003 and Texas Transportation Institute NCHRP Report 414: HOV Systems Manual. Should the District use recommendations from other publications, which either deviate from or are not contained in this document, it is recommended that the District consult with the appropriate Headquarters and District functional units for concurrence.

*Refer to the Division of Traffic Operation's "Ramp Meter Design Guidelines" for guidance on HOV bypass lanes on ramps. For the latest information regarding the Ramp Metering Program, please visit the intranet website address at http://onramp/hq/trafops/otrafopr/frwy_ops/frwy_ops.htm.